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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/911,950	07/24/2001	Barry S. Carpenter	56352US002	5704

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EXAMINER

KNAUSS, SCOTT A

ART UNIT PAPER NUMBER

2874

DATE MAILED: 07/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/911,950

Applicant(s)

CARPENTER ET AL.

Examiner

Scott A Knauss

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-10, 12, 16, 18, 19, 21, 22, 28-30 and 37 is/are rejected.
- 7) ☒ Claim(s) 6, 11, 13-15, 17, 20, 23-27 and 31-36 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10, 11, 13.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 4/28/03 has been entered.

Information Disclosure Statement

2. The references in the information disclosure statements filed 3/31/03, 4/28/03, and 5/16/03 have been considered by the examiner.

Claim Objections

3. Claim 13 is objected to because of the following informalities: Claim 13 recites the limitation "the optical fiber" which lacks antecedent basis, since claim 12, on which it depends claims *one* of an optical fiber and a lens, not both. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5,7-10,12,16,18,21,28,29 and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by US 6,007,208 (Dickensheets et al).

Regarding claim 1, Dickensheets discloses in figs. 1-5 a package for optical micro-mechanical devices (#17,#18) comprising:

one or more optical micromechanical devices (#17,#18) on a first surface of a die (#11), the first surface of the die including a die reference surface (top surface of the die)

a package frame (#14) comprising an aperture (#21) and a first surface of the package frame comprising a package frame surface (bottom surface) proximate the aperture.

wherein the package frame reference surface (bottom surface of frame #14) is adapted to allow the die reference surface (top surface of die #11) to be mounted to the package frame reference surface such that the optical micromechanical devices are located in the aperture

one or more optical interconnect alignment mechanisms (alignment grooves - see fig. 2) formed in the first surface of the package frame, terminating adjacent to the aperture and positioned relative to an optical interface reference plane.

distal ends of one or more optical interconnects #13 located in the optical interconnect alignment mechanisms and optically coupled with one or more of the optical micromechanical devices.

Regarding claims 2-4, the optical interface reference plane can be considered to comprise both the die reference surface and the package frame reference surface, since the fibers #13 are located at the interface between the die reference surface and

the package frame reference surface, and can also be considered to be parallel to the die reference surface, and located between the two surfaces.

Regarding claim 5, as stated previously, the alignment mechanisms are V-grooves.

Regarding claim 7, the surface of die #11 serves as an alignment mechanism, thus alignment mechanisms are located in the package frame reference surface and the die reference surface.

Regarding claim 8 since claim 1 merely states that the alignment mechanisms are positioned "relative" to an optical interface reference plane, the optical interface plane could be considered any surface or plane, including a plane touching the tops of optical interconnects placed in the alignment mechanisms, which would comprise a "tangential" relationship with the optical interface reference plane.

Regarding claim 9 since claim 1 merely states that the alignment mechanisms are positioned "relative" to an optical interface reference plane, the optical interface plane could be considered any surface or plane, including a plane running through a central portion of the optical interconnects thus forming a first portion of an optical interconnect on one side of an optical interface reference plane and a second portion of the optical interconnect on another side of the optical interface reference plane.

Regarding claim 10, the optical interconnects contact the die

Regarding claim 12, the optical interconnect is an optical fiber.

Regarding claim 16, Dickensheets discloses on or more contact pads (#41-#44) interposed between the die reference surface and the package frame reference surface.

Regarding claim 18, the contact pads (#41-#44) electrically couple one or more optical micro-mechanical devices with external electrical contacts (#36-39).

Regarding claim 21, the aperture has a rectangular shape.

Regarding claims 28 and 29, Dickensheets discloses the aperture #21 comprising a cover #16 sealing the package frame to the die.

Regarding claim 37, Dickensheets discloses in fig. 8 and optical communication system comprising fiber #13 and the packaged optical micromechanical device.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 19,22, 27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickensheets et al.

Regarding claims 19 and 30, Dickensheets fails to explicitly disclose a flexible circuit electrically coupled to the die or the contact pads.

However, Dickensheets discloses in fig. 9 the use of control circuits to adjust the position of the two mirrors used in the device. It is well known in the art to fabricate electrical circuits on flexible circuit boards, and thus it would have been obvious to one of ordinary skill in the art to use flexible circuits in order to fabricate the control circuitry for the mirrors used in the device of Dickensheets and thus control the position of the mirrors.

Regarding claim 22, Dickensheets discloses a rectangular shaped opening #21, but does not disclose a complex shape.

Nevertheless, it has been held that more than a mere change of form is necessary for patentability, (*Span-Deck Inc. v. Fab-Con, Inc.* 215 USPQ 835) and it would have been an obvious matter of design choice to simply change the shape of the aperture.

Regarding claim 27, Dickensheets fails to disclose the use of an encapsulating material sealing the die to the package frame.

Nevertheless, it would have been obvious to one of ordinary skill in the art to use an encapsulating material such as an adhesive for the purpose of permanently attaching the package frame #14 to the die #11, thus sealing the die to the frame.

Allowable Subject Matter

9. Claims 6,11,13-15,17,23-27, and 31-37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including

all of the limitations of the base claim and any intervening claims, and to overcome the objections set forth at the beginning of this office action.

Regarding claim 6 in particular, Dickensheets fails to teach or suggest the use of optical interconnect alignment mechanisms comprising V-grooves located in the die reference surface, instead disclosing a silicon plate #12 and electrical contacts #41-#44.

Regarding claim 11, Dickensheets fails to teach or suggest the use of optical interconnects which terminate adjacent to the die without contacting the die.

Regarding claims 13-15, Dickensheets fails to teach or suggest the use of a lens mounted in the alignment mechanisms.

Regarding claims 17 and 20, Dickensheets fails to teach or suggest contact pads on both the die reference surface and package reference surface or a contact pad electrically coupling the micro-mechanical devices with contact pads located on the package frame reference surface.

Regarding claim 23, Dickensheets fails to teach or suggest the aperture having a cross-shape configured so that the distal ends of the optical fibers terminate in arms of the cross shape without contacting the die.

Regarding claims 24-27, Dickensheets fails to teach or suggest a tooling fixture on a rear surface of the die.

Regarding claim 31, Dickensheets fails to teach or suggest electric traces on the package frame, the electric traces electrically coupled to contact pads in the package frame reference surface.

Regarding claim 32, Dickensheets fails to teach or suggest a flexible circuit extending across the rear surface of the die, and one or more vias extending through the die and electrically coupling the micromechanical devices to the flexible circuit.

Regarding claim 33, Dickensheets fails to teach or suggest a shoulder region adjacent to the micromechanical devices, electrical traces extending from the micromechanical devices to the shoulder region, and a flexible circuit located between the shoulder region and the optical interface reference plane, the flexible circuit electrically coupled to the traces.

Regarding claims 34-36, the prior art fails to disclose a package frame having one or more alignment posts positioned to engage with the die reference surface, and a cavity adjacent to the alignment posts on a side opposite the aperture.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Knauss whose telephone number is (703) 305-5043. The examiner can normally be reached on 9-6 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (703) 308 - 4819. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Scott Knauss

Art Unit 2874

sak
July 9, 2003



HEMANG SANGHAVI
PRIMARY EXAMINER